

Deposition and Diagenesis of Ordovician Arbuckle Group Strata, Central Kansas Uplift, Trego County, Kansas

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Arbuckle strata of the Central Kansas Uplift (CKU) consist of cyclic intertidal and shallow subtidal carbonates, pervasively replaced by dolomite, terminated by the Sauk sequence-boundary unconformity. These rocks contain dissolution-collapse breccias that formed in response to exposure to meteoric water during the post- Sauk regression and additional periods of subaerial exposure into the early Pennsylvanian. Despite decades of production, CKU Arbuckle reservoirs are still economically viable because improved secondary and tertiary recovery methods are extracting greater volumes of oil than in the past. To better understand Arbuckle reservoirs, diagenesis and porosity evolution were studied in a representative core from the Murfin Drilling #1-3 Keja well in Trego County, Kansas (Trico Field). Four shallow-marine depositional facies are present, all of which are dolomitized, including oolite grainstone (high-energy shoals), mudstone-wackestone (low-energy marine and tidal deposits), thrombolites, and stromatolites. Dolomite-clast breccias and associated yellow-green shales also are present. Initial diagenesis resulted in pervasive, non-fabric, oblitative dolomitization (fine crystalline) with attending low porosity. The subsequent mid-Ordovician lowstand again exposed these rocks and resulted in karstification and collapse brecciation, and overprinting by a later generation of coarser-crystalline dolomite. Three types of breccia are present – cave-roof crackle breccias, mosaic breccias, and chaotic breccias – and they are associated with vugs and dissolution-enlarged fractures that increased porosity in the rocks. Overall, however, multiple generations of dolomitization in the rocks generally resulted in limited permeability.